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Before the
Federal Communications Commission
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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matter of)
)
Amendment of Parts 2 and 90 of the) RM-9096
Commission's Rules to Allocate the) ET Docket No. 98-95
5.850-5.925 GHz Band to the)
Mobile Service for)
Dedicated Short Range Communications)
of Intelligent Transportation Services)

To: The Commission

COMMENTS OF RESOUND CORPORATION

ReSound Corporation ("ReSound"), by its attorneys, hereby submits its comments in response to the *Notice of Proposed Rulemaking* ("NPRM") in the above-captioned proceeding.^{1/} The following is respectfully shown:

I. Preliminary Statement and Summary

ReSound is one of the largest hearing health care companies in the world and is a worldwide leader in the development and manufacture of scientifically advanced solutions for the hearing impaired, dispensing, audiologist, and pediatric communities. Technological innovations and strategic acquisitions have spurred the company's growth in recent years, and today ReSound is positioned to provide hearing health care products to a wide range of hearing-impaired users.

^{1/} FCC 98-119, released June 11, 1998.

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ReSound, working with Motorola, has developed a technology that will be of enormous benefit to the more than 20 million hearing disabled persons in the United States, as well as additional tens of millions of persons worldwide. These efforts have focused on spectrum in the 5850-5875 MHz frequency range, because of the small number of other users of this spectrum and because of technological and operational benefits offered by this spectrum. The *NPRM*, which responds to a Petition for Rulemaking filed by the Intelligent Transportation Society of America, proposes to allocate 75 MHz of spectrum, at 5850-5925 MHz, “to the Mobile Services and to designate its use for DSRC [Dedicated Short-Range Communications] operations.” *NPRM*, para. 14. As shown in these Comments, the proposed allocation is inappropriate to the extent it encompasses the 5850-5875 MHz band.

II. Use of Hearing Assistance Devices in the 5850-5875 Band

The Commission has expressly recognized the benefits of low power hearing assistance devices such as those being developed by ReSound.^{2/} In the *NPRM*, the Commission seeks comment on whether the 5850-5875 MHz band currently is used for hearing assistance device operations, the likelihood of any such future uses, and whether any measures can or should be taken to protect such uses. *NPRM*, para. 21. As demonstrated herein, the likelihood of low power hearing assistance devices in the 5850-5875 MHz band is both real and immediate. ReSound, working with Motorola, rapidly is

^{2/} See, e.g., *NPRM*, para. 21; *Amendment of the Commission's Rules Concerning Low Power Radio*, 11 FCC Rcd 18517, 18519 (1996).

developing devices that will be available in the near term. Consequently, and in light of the enormous benefits offered by such devices, ReSound requests that the Commission take no action that will impede the near-term deployment of very low power hearing assistance devices in the 5850-5875 MHz band.

Although hearing assistance devices do not presently operate using the 5850-5875 MHz band, as the Commission is aware, ReSound and Motorola have spent substantial capital and resources over the past several years developing such devices. Together, Motorola, with its expertise in wireless communications, and ReSound, with its focus on the hearing disabled community, have developed a highly sophisticated and efficient hearing aid device which will provide significant communications opportunities for the hearing impaired. ReSound has manufactured a prototype of the hearing assistance device and continues to make design and technical improvements in preparation for marketing the device to the public.

The ReSound device is a very low power (1mW transmit power), battery-operated hearing aid device which uses a two-way link between an earpiece worn in, or at, the user's ear and a processor worn by the user at a location remote from the earpiece (e.g., on the user's belt or stored in a purse. The product is bi-directional, meaning that the user hears, through the earpiece, both his or her own voice as well as the voice of the person with whom he or she is communicating. This design permits easy two-way communications. Audio signals from the environment are picked up by a microphone in

the earpiece and transmitted over the primary two-way wireless link to the remote processor, where the audio signals are enhanced according to the needs and environmental conditions of the user, and then are transmitted over the primary wireless link to the earpiece which projects direct sound into the ear canal. The technology improves upon traditional hearing aids because the earpiece incorporates both a microphone and speaker which amplifies the user's voice as well as the speaker's and transmits these to a high power open architecture digital signal processor ("DSP") in the remote processing unit, thus potentially increasing tremendously the speaking as well as auditory abilities of hearing-impaired individuals.

The device allows a user to communicate even in a large room in which many individuals are talking simultaneously, and where there is considerable background noise. In a noisy room, the highly sophisticated directionality or self-identifying feature of the device focuses on the sound closest in proximity to the user and feeds that sound or voice into the user's earpiece. Therefore, simultaneous conversations will not interfere with the user's ability to communicate in noisy situations. Furthermore, the device filters out reverberations, thereby improving sound quality for the user.

The technology, developed for the 5.8 GHz band in order to eliminate the need for physically large and power-consuming electronics components in the earpiece, also eliminates the need for conventional remote controls, and provides a variety of optional features which may be added as needed. Until recently, hearing aids were large

and cumbersome. Advancements in wireless hearing aid technology, particularly focused on the 5.8 GHz band, have overcome these impediments and the stigma associated with wearing hearing aids. By concentrating the high performance DSP signal enhancement hardware in the remote processing unit, the separate earpiece can be made sufficiently small as to be invisible to the casual observer, and the small antenna can be disguised easily in the ear. Miniaturization of components within the device allow it to be worn unobtrusively. Furthermore, because signal processing is performed in the remote processor rather than in the earpiece, the design optimizes its small size and compensates for power constraints in the earpiece. One very favorable feature of a version of ReSound's new device is that the processor can be used with any type of hearing aid, not just those manufactured by ReSound.^{3/} Advanced features may be easily added by software downloads. Such features might include safety notification, which reminds a user to take medication or of appointments.

Motorola has recently launched a wired version of the bi-directional communications device. The wireless version, utilizing the 5850-5875 MHz band for transmissions between the earpiece and the processor, is under development. The wireless device affords even greater flexibility and mobility for its users, and, in fact, is vastly preferred among users in studies conducted by ReSound and Motorola.

^{3/} The hearing assistance product has been developed on an open platform which allows other individuals and institutions such as universities to develop future advanced technology which will enhance the effectiveness and efficiency of the product.

Consequently, it is believed that consumer demand for the superior wireless design will far outweigh demand for the wired model.^{4/}

In addition to its hearing assistance function, the processor serves as a hands-free connection to external communications systems (e.g., digital or analog cellular telephones) for use by both the hearing impaired and non-hearing impaired. When used in this capacity, a cellular phone user is afforded greater flexibility and may use the phone more safely while operating a vehicle. While this clearly is a potential marketing opportunity for ReSound's and Motorola's products, at this time ReSound is focusing its efforts on introducing the product into the hearing aid device market.

The devices will efficiently use the 5850-5875 MHz band. The need for as small an earpiece as possible, and the need for a low power device, dictate an extremely small battery. However, there also is need for extended battery life. The battery in the device has been designed to last from two to six weeks, depending on the mode of operations, so that users may implement a regular replacement schedule. Such a schedule is important for the convenience and safety of all users, but particularly for the hearing disabled and public safety communities. Because of the size of the components, no coding of the audio information can be performed. The requirements of large amounts of uncoded data to be sent from the ear to the remote processing unit, coupled with the need

^{4/} Product testing in the public safety community, for example, has been overwhelmingly positive. Firefighters and police officers who have tested the product found that it increases their flexibility and mobility as they carry out their public safety tasks.

to accommodate multiple users in a confined space (e.g., in an office or an automobile), justifies the need for 25 MHz of spectrum.

Because the hearing assistance device operates at very low power, it is sensitive to interference from any other users in the band. Presently, ReSound believes that there are few other users at 5850-5875 MHz, and that to the extent other users are present, the likelihood of actual interference is small.^{5/} The allocation of spectrum proposed in the *NPRM*, however, would result in DSRC uses of the 5850-5875 MHz band that could interfere with the products developed by ReSound and Motorola. As explained below, ReSound opposes the use of the 5850-5875 MHz band for DSRC applications to the extent such applications would result in interference to low power hearing assistance devices operating in that band.

^{5/} The 5850-5875 MHz band is part of a primary government allocation for radiolocation operations (5850-5925 MHz), a primary non-government allocation for fixed satellite service uplink transmissions (5650-5925 MHz), and a secondary allocation for amateur radio operations (5650-5925 MHz); Industrial, Scientific, and Medical devices having an allocation of 5725-5875 MHz also may operate in the band. 47 C.F.R. § 2.106. Low power unlicensed devices also may use the band in accordance with Section 15.249 of the Commission's rules. To ReSound's knowledge, none of the government radiolocation transmission facilities (believed to be tracking radars operational only for brief periods of time and at locations remote from and not accessible to the general public) located throughout the United States operate within the 5850-5875 MHz band; although out-of-band emissions from such facilities are possible their effects can be mitigated, for example, by the use of filters or reflection devices. Testing is underway to determine the potential for, and methods for resolution of, interference from such radars, as well as from fixed satellite service facilities, of which there are believed to be fewer than 60 in the U.S. Furthermore, ReSound has determined that C-band weather radars such as those found at airports and used by television stations operate below 5700 MHz. *See, e.g.*, description of products at www.eecradar.com/products.html.

III. Proposed DSRC Uses Do Not Justify an Allocation of 75 MHz

The *NPRM* seeks comment on whether it is appropriate to allocate a full 75 MHz of spectrum for DSRC operations. *NPRM*, para. 14. Such an allocation is excessive at this time for several reasons.

First, the Transportation Equity Act for the 21st Century (“TEA21”),^{6/} enacted earlier this year, requires the Commission to “consider ... spectrum needs for the operation of intelligent transportation systems, including spectrum for the dedicated short-range vehicle-to-wayside wireless standard,” and to “complete[] a rulemaking considering the allocation of spectrum for intelligent transportation systems” by January 1, 2000.^{7/} TEA21 made no conclusions about the spectrum needs of ITS, instead leaving such determinations to the Commission. In the absence of any statutory mandate, an allocation of 75 MHz would far exceed the needs for ITS, of which DSRC applications are a component.^{8/}

Second, the Commission already has allocated 14 MHz of spectrum for intelligent transportation system uses. Consideration of this existing allocation in the context of this proceeding is consistent with TEA21. On December 15, 1998, the

^{6/} Pub. L. 105-178, signed June 9, 1998.

^{7/} *Id.*, Section 5206(f).

^{8/} ITS “refers to the collection of advanced radio technologies that, among other things, is intended to improve the efficiency and safety of our nation’s highways.” *LMS Report and Order*, 10 FCC Rcd 4695 (1995), n.9.

Commission will begin auctioning 528 licenses authorizing the provisions of a range of location and monitoring services (“LMS”),^{9/} which are similar to the DSRC services described in the *NPRM*. See *NPRM*, Appendix B. Moreover, no party has adequately explained how the proposed DSRC uses are so different from LMS as to justify an five-fold increase in ITS spectrum. In this regard, it should be noted that many DSRC uses proposed by ITSA and listed in the *NPRM* are virtually identical to the services proposed by ITSA when it earlier advocated an allocation of LMS spectrum.^{10/}

Third, neither the Commission nor any DSRC proponent has suggested how spectrum for DSRC uses will be licensed. If the spectrum is to be auctioned, then the results of the LMS auction later this year will be instructive with respect to the need for additional spectrum for comparable uses. Furthermore, assuming that DSRC proponents foresee commercial applications, they have not shown that there is a broad

^{9/} “LMS refers to advanced radio technologies designed to support the nation’s transportation infrastructure and to facilitate the growth of Intelligent Transportation Systems.” *LMS Second Report and Order*, FCC 98-157, released July 14, 1998.

^{10/} Compare *NPRM*, Appendix B, with *LMS Report and Order*, 10 FCC Rcd 4695 (1995), n.59. When existing services and allocations, as well as the capabilities of existing communications systems, are considered, the need to allocate additional spectrum for certain prospective DSRC applications (e.g., “Incident Management” operations which “would use roadway sensors and DSRC-equipped vehicles to more quickly detect traffic congestion,” *NPRM*, para. 4), is not readily apparent.

market for such applications -- most, if not all, of which will require consumers to purchase and place equipment in their vehicles.^{11/}

Finally, an allocation of 75 MHz would reward inefficient spectrum usage. DSRC spectrum needs, as calculated in a report prepared by ARINC for inclusion with the ITSA Petition for Rulemaking, “was determined to be 8 channels of 6 MHz each, or 48 MHz total.” An additional 27 MHz -- for a total of 75 MHz -- was requested to “facilitate sharing the band with other services,” but the need for that additional spectrum has not been adequately explained. Moreover, the report’s bandwidth requirements are based on 600 kbps data transmission rates within 6 MHz channels. The report acknowledges, however, that “the data rate could be accomplished in less bandwidth with more complicated modulation schemes.” The report asserts that “the less complex schemes are used to maintain the lowest tag cost possible.” Based on ReSound’s substantial experience in developing products for the 5850-5875 MHz band, ReSound believes, contrary to the ARINC report, that it is not necessary to sacrifice efficiency in order to control costs. Continuing technological advances have resulted in more spectral efficient and cost efficient digital technologies than may have been available when the ARINC report was prepared several years ago. These advances must be taken into consideration when considering overall ITS spectrum needs.

^{11/} Of course, if a consumer market is not proposed, then ITS spectrum needs should be dramatically less than 75 MHz.

IV. Conclusion

In the *NPRM*, the Commission acknowledged that proposed DSRC applications may cause interference to the very low power hearing health care devices developed by ReSound to operate in the 5850-5875 MHz band. *NPRM*, para. 21. Based on the likelihood of such interference, ReSound opposes an additional allocation of spectrum for Intelligent Transportation Systems that includes 5850-5875 MHz. Should that spectrum be included in a further ITS allocation, however, DSRC uses should be prohibited from causing harmful interference to other users.

WHEREFORE, the foregoing premises duly considered, ReSound respectfully requests that the Commission adopt rules in this proceeding consistent with the foregoing.

Respectfully submitted,

RESOUND CORPORATION

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CERTIFICATE OF SERVICE

I, Michelle A. Harris, a secretary with the law firm of Paul, Hastings, Janofsky & Walker LLP, hereby certify that I have on this 14th day of September, 1998, caused a true and correct copy of the foregoing Comments of ReSound Corporation to be hand-delivered to:

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